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THE JOURNAL OF PERIODONTOLOGY is published to serve as the professional journal of periodontia; to keep dentists in touch with research being carried on in this field and related sciences; to stimulate greater interest in the supporting tissues of the teeth and their relation to oral and general health. The plan to continue the publication of abstracts indefinitely will make the Journal a fund of extensive information, readily available to students, teachers, researchers, and clinicians.

The Journal is the official organ of the American Academy of Periodontology and will contain, therefore, those papers of scientific and clinical interest which are presented at the annual meetings of that society. Abstracts of some important articles related to periodontology are published in this year's issues.

We are grateful to all who have made available the subject matter from which the abstracts and copies of abstracts have been made, including the authors of the original articles, owners of the journals mentioned in the text of the abstract section, and those who have aided by contributing the material for this issue.

THIRTIETH

ANNUAL MEETING

AMERICAN ACADEMY OF PERIODONTOLOGY

OCTOBER 17-19, 1946

THOMAS JEFFERSON HOTEL

BIRMINGHAM, ALABAMA

THE JOURNAL OF PERIODONTOLOGY

OCTOBER, NINETEEN HUNDRED FORTY-SIX

Atomic Versus Molecular Oxygen*

By BALINT ORBAN, M.D., D.D.S., *Chicago, Illinois***

INTRODUCTION

OXYGEN has been used in dental therapeutics in three different forms. One is oxygen insufflation, using medicinal oxygen from a tank. The oxygen is blown into the soft tissue, penetrating through breaks in the surface of the mucous membrane. This method is known as "Dunlop's Method" of oxygen treatment (1). The oxygen employed in this method is a molecular oxygen, the formula of which is O_2.

A second form is Ozone (O_3) which is produced by electric sparks from the molecular oxygen (2). It has been used similarly to the Dunlop insufflation; its use, however, is limited because of the highly irritating effect of the ozone upon the mucous membrane of the larynx. Since ozone is a strong antiseptic, the use of it has been recommended for root canal therapy. Up to the present time this method has not been scientifically proved of value.

The third method of oxygen treatment employs drugs which liberate oxygen when in contact with tissue fluids in which oxidizable substances are present. The oxygen which develops this way, in *statu nascendi,* is atomic oxygen, with the formula "O" having two electrons free to go into a chemical reaction, which leads to oxidation. There are different drugs of this type. The most commonly used is hydrogen peroxide (H_2O_2) which breaks up into H_2O and O under the influence of the enzyme catalase which may be present in the tissue fluids.† It has been shown that the oxygen which is liberated from H_2O_2 (Superoxol), if properly applied, penetrated into the tissues, forming innumerable bubbles (3). It was assumed that the oxygen penetrating the tissue leads to better local oxidation, and thus to diminishing chronic inflammatory reaction, consequently creating a favorable environment for tissue regeneration.

Both methods, the insufflation of molecular oxygen and the use of atomic

* Paper read at the 24th General Meeting of the International Association for Dental Research, Kansas City, Missouri, March 16-17, 1946.

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†Actually, atmospheric or tank oxygen has the structure $(O_2)n$ where n is a large number. It is, then, a polymerized form. On the other hand, when hydrogen peroxide decomposes the following reaction takes place: $2\ H_2O_2 \rightarrow 2\ H_2O + O_2$, where the O_2 is in the monomeric form. This O_2 *molecule* has two unpaired electrons which can go into chemical reactions very easily. We should, more properly, speak of polymeric and monomeric oxygen, rather than molecular and atomic oxygen. However, it is the custom to speak of the reactive, or nascent oxygen as atomic oxygen, and chemical reactions are almost always written in this manner. This usage is adhered to in the present paper.

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oxygen developing from Superoxol have their advocates, and favorable results have been reported with both means.

The observation of a case of "bismuth line" gave the author a welcome chance for experimentation to determine possible differences in the action of the atomic and molecular oxygen.

It is known that the bismuth line (Fig. 1) is due to deposition of an insoluble black bismuth sulfide precipitate into the tissues of the inflamed gingiva. In a healthy gingiva no bismuth line would develop. This is due to the fact that the presence of hydrogen sulfide is necessary to form bismuth sulfide. Hydrogen sulfide develops as a result of bacterial action upon protein substances. If bacteria are present they produce irritation and thus an inflammatory reaction results. The hydrogen sulfide penetrates into the tissues and enters into reaction with the bismuth salts which reach the tissues from the capillaries forming an insoluble black precipitate (Fig. 2). This bismuth precipitate occurs only in the most superficial layers of the pocket side of the gingival papilla[1].

The bismuth precipitates as a heavy amorphous mass in the connective tissue (Fig. 3A) and is taken up by phagocytes. It also precipitates in the endothelium of capillaries (Fig. 3B) and in the limiting membrane at the epithelio-connective tissue border.

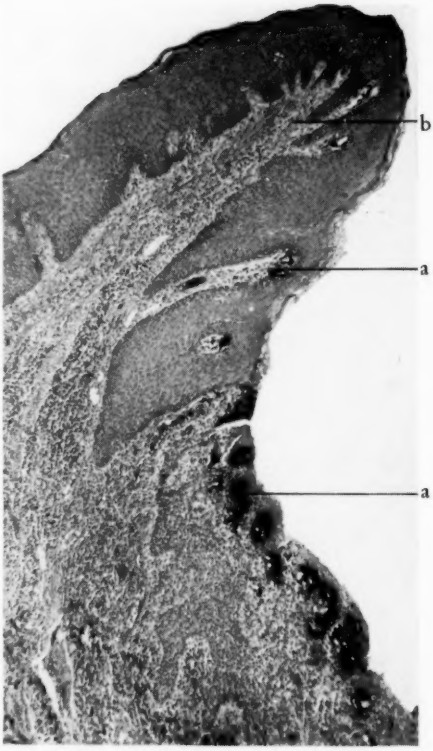

Fig. 2. Microscopic specimen of bismuth line. The bismuth sulfide precipitates are close to the surface of the gingival pocket in the connective tissue papillae (a) gingival margin (b).

INVESTIGATION

It has been assumed that if active atomic oxygen were carried into the gingiva having a bismuth line, the bismuth sulfide would be oxidized into bismuth sulfate, which is white and soluble. Thus the bismuth line would disappear. The experiments prove this assumption to be a fact. Fig. 4A shows, in the gingival margin of the right mandible, a bismuth line of considerable severity. In the right cuspid area, Superoxol was applied several times at the same appointment so as to obtain a considerable blanching of the tissues (3). In about ten minutes, the blanching disappeared, indicating that the oxygen bubbles had vanished from the tissues. This treatment was repeated once more in the same appointment. By the time the blanching again disappeared, the bismuth line was also gone (Fig. 4B).

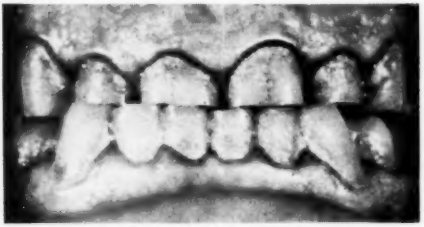

Fig. 1. A case of "bismuth line."

This experiment was confirmed repeatedly by clinical tests. Later a case came under

[1]In oral communication, H. B. G. Robinson expressed the opinion that the precipitation of bismuth in the subepithelial capillaries and connective tissue of the gingival pocket is the result of "anachoresis."

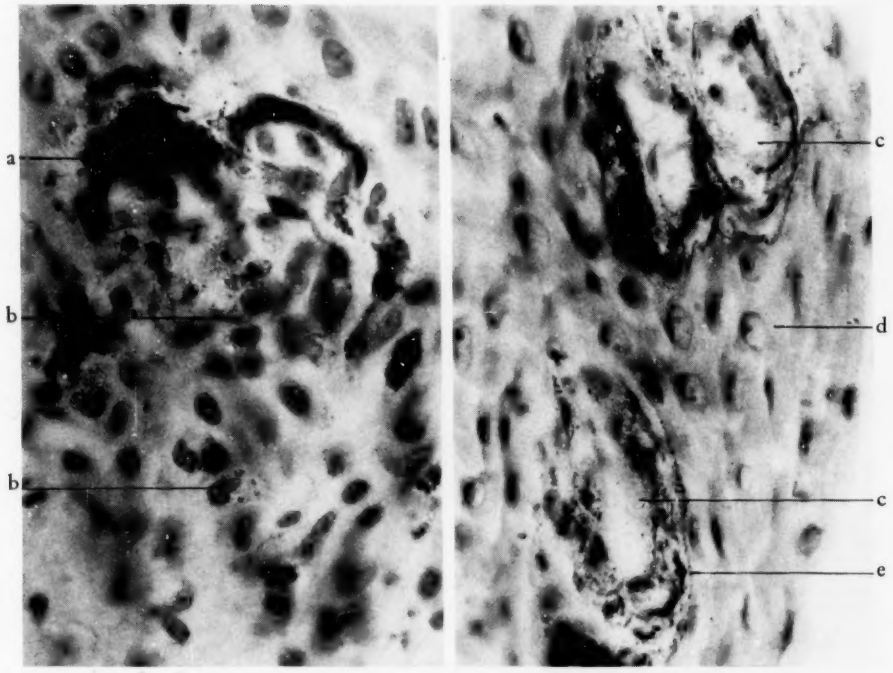

Fig. 3. High magnifications of the bismuth precipitates. (a) Heavy deposits in the connective tissue papilla. (b) Fine droplets of bismuth sulfide within phagocytes. (c) Capillaries—bismuth precipitate in the vessel walls. (d) Epithelium. (e) Fine precipitate of bismuth in the limiting membrane.

observation in which biopsy specimens could be obtained. Previous to the experimental application of oxygen a gingival specimen was obtained (Fig. 5) showing the bismuth sulfide precipitates on the pocket side of the gingival papilla[2]. A high magnification of the precipitates shows that it consists of a fine granular mass lodged mainly in phagocytes and also in the intercellular substance (Fig. 6).

Superoxol was applied to several affected areas until the tissues turned completely white. The oxygen disappeared from the tissues and then again Superoxol was administered. Fifteen minutes later two biopsy specimens were taken (Figs. 7A and B). The specimens still show some oxygen bubbles and considerable amount of edema. The bulk of the bismuth precipitate dis-

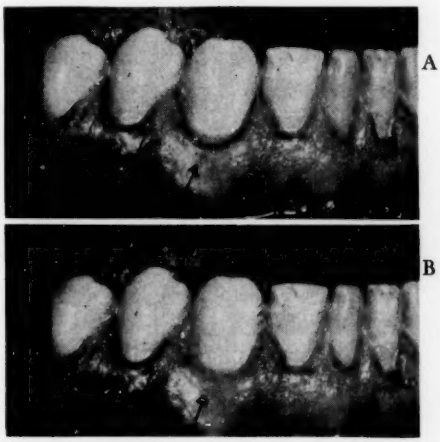

Fig. 4. A. Bismuth line.
B. Bismuth line disappeared at the cuspid after application of H_2O_2.

[2]All specimens were fixed in 75% alcohol to avoid any possibility of a chemical reaction from the fixing solution.

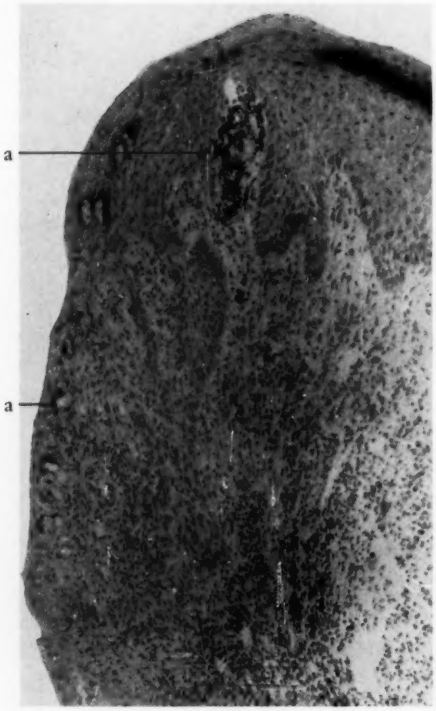

Fig. 5. Bismuth precipitates in the connective tissue papillae (a) of the gingiva.

appeared. Only finely dispersed precipitates are seen in very limited areas under high magnification (Figs. 8A and B).

When oxygen insufflation was administered, using tank oxygen, the bismuth line did not disappear (Fig. 9). Oxygen was blown into the gingiva by punching the surface of the mucous membrane with a sharp explorer and the canule was placed to this opening. The oxygen was forced into the gingiva with approximately twenty pounds of pressure. The gingiva became blanched by the pressure of oxygen. About fifteen minutes after the first insufflation the process was repeated and after fifteen more minutes the gingiva was removed. No effect whatsoever could be detected on the bismuth precipitates[3].

DISCUSSION

In comparing the action of atomic and molecular oxygen upon the bismuth sulfide precipitates in the gingiva, we have now an *in vivo* test for the action of these two different forms of oxygen. It was found that the bismuth sulfide disappeared from the tissues treated with Superoxol (atomic oxygen) and did not disappear when treated with the tank oxygen (molecular oxygen). From the chemical point of view this result is in no way remarkable or surprising. If the insoluble black bismuth sulfide is treated in the test tube with Superoxol, oxidation results, and a white soluble bismuth sulfate precipitate results. If, however, oxygen is led into the test tube, through a glass tube, for any length of time, no perceptible change occurs.

Only one reference was found in literature concerning this problem, and that in a

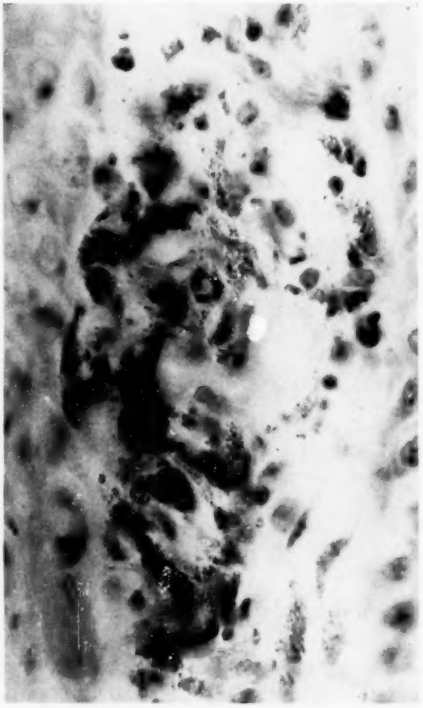

Fig. 6. High magnification of bismuth precipitates from Fig. 5.

[3]The writer is indebted to Dr. Stephan Rothman. Head of the Department of Dermatology, University of Chicago, for permission to carry out some of the clinical observations in his department.

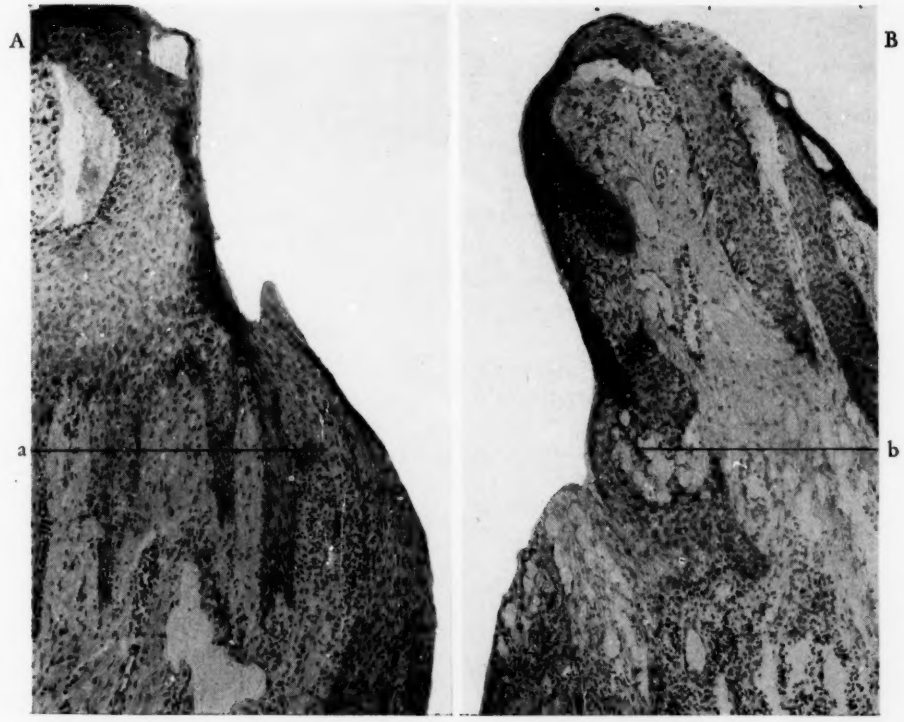

Fig. 7. A and B. Gingival papillae from the same case as Figs. 5 and 6. After application of H_2O_2 bismuth precipitates disappeared.

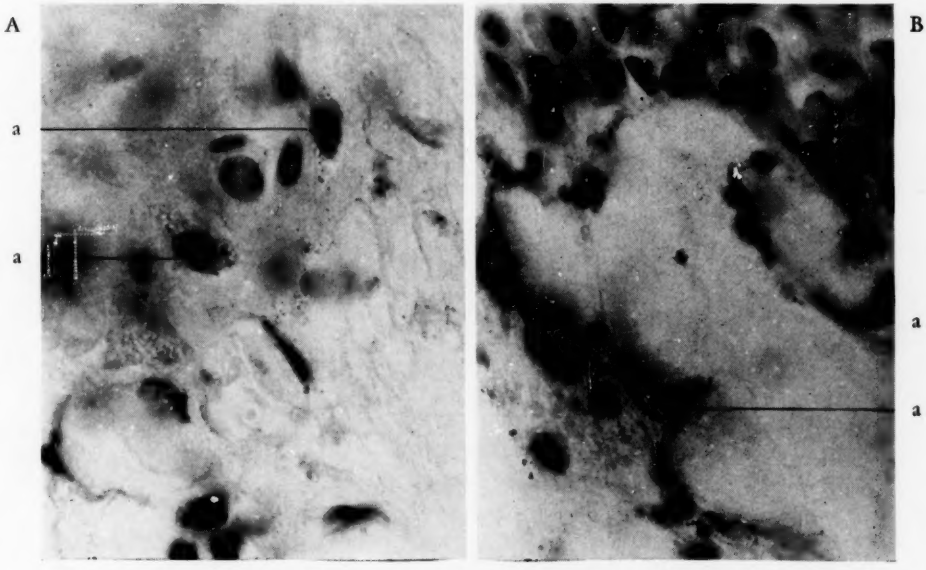

Fig. 8. A and B. High magnifications of Fig. 7 A and B respectively from the regions a and b. Only a few fine droplets of bismuth can be seen in phagocytes (a).

negative sense. In the book of Prinz and Greenbaum (4) the following statement is made: "It is claimed by Hentze that if a few drops of hydrogen peroxide are placed upon the discoloration, the black color of bismuth sulfide will remain constant while lead sulfide will turn into white lead sulfate." Fortunately this reference was unknown to the author previous to this investigation.

The experiment presented here shows us that there is a difference in the chemical action of atomic and molecular oxygen as used in dental therapeutics, tested on the bismuth line. It gives us no information as to the biologic action of the different forms of oxygen upon the inflamed gingiva. The clinical observation, that the tank (molecular) oxygen is a valuable aid in the treatment of certain types of gingivitis, still might hold true. Its action might be purely mechanical or chemical; none of it has been scientifically proved as yet. The special biologic action of the oxygen developed from Superoxol was discussed in a former paper (3). Only by further experimental investigation and more such biologic tests can we solve the question of drug actions in dental therapeutics. The fact that bacterial action is necessary for the formation of the bismuth line and that the bismuth sulfide only precipitates in the most superficial tissue layers of the pocket side of the gingiva could be considered as biologic proof for the assumption (also held by the author) that in gingival inflammation bacteria are only lodging in the gingival pocket and not in the deeper tissue layers.

Fig. 9. Same case as Figs. 5, 7, and 8. Papilla after administration of tank oxygen. The bismuth precipitates did not disappear (a).

CONCLUSIONS

By using oxygen in *statu nascendi* (atomic oxygen) the insoluble black bismuth sulfide precipitates are oxidized and transformed into soluble white bismuth sulfate and thus the bismuth line disappears.

Molecular oxygen, as obtained by using the medicinal tank oxygen and insufflated into the gingiva, fails to oxidize and remove the bismuth sulfide precipitates.

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In Our Opinion

THE NUTRITIONAL AND SYSTEMIC BACKGROUND IN SOME CASES OF PERIODONTOCLASIA

Initial Statement

By HAROLD J. LEONARD, D.D.S., B.A., *New York 32, N. Y.*

IN the April, 1944 issue of this Journal the In Our Opinion Department discussed "Nutritional Factors Relating to Gingival and Periodontal Health and Disease." Your leader was taken rather severely to task by two of the discussers because he stated that "Essentially gingivitis and periodontoclasia are local diseases related to bacterial accumulations, local function, and local blood supply." Their distress that this purely dental, mechanistic approach to periodontoclasia should prevail among periodontists was so great that it seemed wise to continue the discussion when further data became available. There is as yet no large body of direct proof that periodontoclasia always or usually has some systemic background etiology but some new facts suggest that diagnosis and treatment along the lines of general health might well be useful in periodontoclasia as well as in other dental disease cases.

By diagnosis and treatment along the lines of general health, I do not mean the routine examination by a general physician. Experience has proved that reference to a physician for cases that the periodontist suspects must have a systemic or constitutional defect because of recurrent Vincent's infection, intractable periodontoclasia or rampant dental caries, is useless. Physical examination, ordinary case history taking, blood count, routine urine analysis do not, in these cases, yield significant findings. Further than this the physician cannot go at present without some clue. There are hundreds of chemical and physical tests available but they are costly and certainly not to be given without some definite indication.

Doctors Karshan and Tenenbaum[1] of Columbia University have been working for several years on chemical tests of periodontoclasia cases to see if there may be some common chemical background defect. 137 periodontoclasia cases and 54 controls altogether in two series have been given 40 tests selected as most likely to be significant. They find blood calcium high, phosphatase high, globulin high, sugar high, sedimentation rate high, ascorbic acid low, red blood cell count low and white blood cell count high, more often in the periodontoclasia cases than in the controls. The differences for phosphatase and sedimentation rate are statistically valid for both series. The others for one but not for both. But none of these defects is common to any large proportion of the periodontoclasia cases. The evidence suggests that periodontoclasia cases are usually not

[1]Paper of Karshan *et al* published in the August, 1946 issue of the *Journal of Dental Research.*

otherwise well but that the background condition, if it is acting as an etiologic agent, may be any one of several kinds. They found no evidence to suggest that sub-clinical deficiencies of thiamin, riboflavin, nicotinic acid, and vitamin A is significantly associated with periodontoclasia.

It seems likely that the dental diseases periodontoclasia, gingivitis, Vincent's infection, dental caries, dental erosion and malocclusion in so far as they have a systemic etiology are due to general mild defects in health which may be brought about by several means. Certainly dental caries is not due only to the use of sugar and wheat flour and Vincent's infection is not due solely to deficiency of nicotinic or ascorbic acid in the body.

A significant finding in Karshan and Tenenbaum's study was that of thirty-seven cases under the age of thirty-three all but two were females and in less than half, and these the older ones, could a local etiological agent (calculus, traumatic occlusion, shifting, food impaction) be discovered from the radiograms and case histories. Some of these cases had had severe periodontoclasia at the age of twelve leading to loss of teeth with nothing local ascertainable to account for it. The author has had a few of these child cases in his practice and has found it difficult if not impossible to establish dental health and stop all progress of periodontoclasia. Cases like these convince one of some background condition but up to this time none has been discovered and proved.

The probability is that all of these dental diseases have faults in nutrition as background predisposing conditions. The evidence for this is that where optimal nutrition prevails dental diseases are almost nonexistent. Where dental diseases are rife, nutritional defects are extremely common. Nutritionists apparently agree that the great majority of Americans live on a suboptimal diet. Nutritional defects also are exactly the ones that are not detected by the physician in his routine examination. The common symptoms of nutritional defects, chronic fatigue, nervous irritability, gastro-intestinal disturbances, susceptibility to colds, suggest tonics, cathartics, and vaccines to the physician, not hygiene reform. It is rather to the nutritionist and hygienist that we must turn for help in these cases.

Hygienic defects that may predispose to dental disease, as well as other mild ill health, are not only vitamin deficiencies. Dr. Krasnow of the Guggenheim Dental Clinic in New York in studying and correcting chemical background conditions, in children suffering with dental caries susceptibility, finds that water intake, sufficient sleep, regularity of habits, sufficient complete protein, moderation in sugar, and the acid-base balance of the body as influenced by food are as essential as sufficient vitamins.

It is probable that too great attention to vitamin deficiencies and not enough to other health factors, is the reason why attempts to correct suspected systemic background conditions by analyzing the diet and supplementing with vitamins have led to failures on the part of the author and other dentists struggling with this problem. The diet analysis in the author's cases so seldom showed the

suspected deficiency that for a long period he was discouraged with this method of diagnosis and treatment. He came to the conclusion that diet analysis is a very uncertain and unsatisfactory method of determining deficiencies. Some of the uncertainties lie in tables, no two of which are in exact agreement. A food giving a certain proportion of vitamin in one table may give a very different amount according to another. Foods vary widely depending on soil, culture, climate, and method of gathering, ripening, storing, transporting, preparing, cooking and serving. A recent study showed that a diet list as prepared by a patient always differs by at least 20 per cent at some point from the actuality. Moreover, the dietary needs of the patient may vary widely depending on digestion, absorption, elimination, and special needs or vitamin destructions that occur in periods of stress, endocrine dysfunction or disease. Some of the B group vitamins are manufactured in the normal intestine by bacteria that grow there but these may be swept out by mineral oil administration or other intestinal medication. Furthermore, even though the diet in one week's list is optimal, it does not eliminate the dietary factor, for many of these breaks in health especially in older persons are the cumulative result of years of slight faults in the past. All students of nutrition emphasize that it takes a long period of optimal nutrition to undo the effects of years of deficiency.

In spite of these uncertainties nutritionists rely on the estimates of diets based on tabulations of a one or two week's diet report. They say that errors tend to cancel each other out and a good diet will sum up as a good diet and a bad diet as defective. At present the diet analysis and hygiene case history are the only practical means of discovering nutritional and hygienic errors. Complete tests for vitamin, mineral and protein levels, acid-base balance, etc., in the blood are simply not practical for routine purposes at this time.

Experiments to improve health based on diet analysis and hygiene history are proving successful. Dr. Krasnow at the Guggenheim Clinic has greatly reduced the rate of dental caries and greatly improved the health of children where it was possible to get good coöperation. Studies in industries where protective food factors were given to employees have shown great improvements in health, efficiency and freedom from absence. A group of dentists and physicians in California have formed the American Academy of Applied Nutrition and in coöperation with an expert nutritionist are analyzing diets and making corrections with gratifying results in many cases.

A factor in the great amount of physical defectiveness in the United States may be the substitution of chemical fertilizers for organic compost in farming. J. I. Rodale in his book *Pay Dirt* has shown very convincingly that health is less perfect in plants, animals, and man where organic matter is depleted from the soil. Where human beings reach most perfect physical health as in the Hunza Tribe in Northern India, as recorded by McCarrison, the soil is most carefully composted. The bacteria of the soil are dependent on organic matter and it is they that manufacture many of the vitamins necessary for plant and animal health.

A placard in the window of an outlet store for a well-known health food concern reads as follows:

Why didn't grandfather need vitamins? He didn't eat meat that was artificially cured, aged, and tenderized. He didn't drink milk from cows that had never seen a pasture. He didn't eat eggs from artificially forced chickens who had never been outside four walls nor caught, a healthy worm. His vegetables though fewer, weren't grown on worn out or artificially fertilized soil. His fruits, fewer too, weren't pick d green, colored in a gas chamber or refrigerated over months and thousands of miles. And his flours and sugars weren't refined and sulphured to the point where they are slow poison.

Convincing proof that susceptibility to periodontoclasia is due to nutritional defects is not yet at hand. Enough is at hand to suggest that periodontists should ally themselves to nutritionists and hygienists as well as physicians. Patients should have diets analyzed and should be otherwise studied for defects in living which ought to be corrected. It seems very probable that much valuable service might be rendered not only in regaining and maintaining dental health but in helping people to gain and maintain abundant and exuberant general health.

The author was much impressed by a recent patient, a physician who had a peculiar, deep red gingiva that responded very unsatisfactorily to usual treatment. A systemic cause was suggested so the physician had a more than usually thorough physical and chemical check up made with negative results. Within a month the paper announced his death from heart attack. There is considerable evidence that the degenerative diseases of later life are merely the cumulative effects of nutritional defects over a long period.

Rigorous scientific control must be maintained on nutritional research if it is to be reported. All nutrition work has become so suspect through the humbug of charlatans, mystics, and crackpots that scientific students have to lean backwards in controlling their work if it is to receive credence. There is great need to study periodontoclasia cases from a nutritional standpoint and to determine whether the disease has in fact a systemic background due to nutritional defects and whether nutritional correction will aid in reëstablishing periodontal health.

Discussion

R. GORDON AGNEW, M.SC., D.D.S., PH.D.
MARY CALDWELL AGNEW, M.A.
Toronto 10, Ontario

We find ourselves in substantial agreement with the statements of Dr. Leonard regarding present knowledge of the nutritional and systemic aspects of periodontal disease. Existing evidence would not justify a position that "periodontoclasia always or usually has some systemic background etiology." However, much accumulated clinical observation and experimentation, controlled and uncontrolled, examined in conjunction with animal studies, would seem to point with clarity to the high advisability of increased emphasis upon the correlation of local and systemic conditions.

Periodontal disease amongst the Chinese (in China) would seem to be related to systemic states with greater frequency than is commonly indicated in reported American experience.

Our experience as to the relative ineffectiveness of the ordinary routine examination by the physician is similar to that described. However, in China, such routine procedures

do yield occasional findings of such value as to justify, we feel, continuance of such routine in cases of obvious complexity. Moreover, apart from the possibility of their immediate clinical usefulness, the actual value of the common, and many of the less usual tests has still to be convincingly decided through the studies of many clinicians.

We agree that, generally speaking, laboratory findings do not indicate defects common to any large proportion of periodontal cases. (Preliminary laboratory studies in Eastern Tibet suggested, in the case of Vitamin-C deficiency, widespread inadequacy in this factor.) Background systemic states possibly related to the conditions mentioned may be of many varieties. Our experience with certain intractable cases is in agreement with Dr. Leonard's observations.

We would amend the statement that "Probably all of these conditions have faults in nutrition as background predisposing conditions" to "Probably *most* . . .", reserving, for example, such states as intestinal parasitic infestation in which nutritional influences would not necessarily be primary in character.

It would seem incontestable that the majority of Americans subsist on suboptimal diets, the defects of which frequently elude the routine examination; also that the conventional treatment, by the physician, fails to utilize modern knowledge as made available through coöperation with the nutritionist.

In addition to the non-vitamin factors listed as potentially related to dental and oral diseases, psychic states might be advantageously included.

Diet analysis, depending upon the coöperation of the patient obviously fails of precision through subjective attitudes of the patient and through the conditions listed. However, in the absence of a more dependable modus operandi its value would seem to justify its continued use. In urban areas, the assistance of social service agencies might, in the cases of certain types of patients, make possible the securing of more accurate data on nature, preparation and quantities of food consumed. (In connection with the effects of faulty replenishment of the soil, reference might again be made to Chinese studies indicating the high biological value to the race of the age-old custom of conservation of human excreta for use on the soil.)

We agree indeed that such analysis, followed by appropriate action, may affect human welfare beyond the limits of oral health. For example, we are increasingly of the opinion that the so-called "Lethargy of the East" is not so much a matter of racial characteristics, climate, etc., as one of nutritional deficiency (and the observer need not travel so far afield to find cause for concern!) Successful institutional enterprises in health improvement through dietary means are increasingly numerous in many countries.

More emphasis should be laid upon the study of, and the general public understanding of, the influences of long-continued deficiency on the production of the so-called "age changes" and on longevity.

Nutritional diagnosis, therapy, and prevention should be more widely recognized as procedures integrally related to the field of the dentist and periodontist. Faddism should be scrupulously avoided; natural sources for deficient elements advocated as far as feasible. In vitamin therapy, except for diagnostic confirmation or symptom alleviation, too restricted prescription should be avoided in favor of multi-vitamin therapy and general nutritional balance.

ALLISON G. JAMES, D.D.S.
Beverly Hills, California

All disease is disturbed nutrition, of the cell, tissue, organ, part or organism affected, be the cause what it may. Nutrition is the process or sum total of all the processes through which growth is promoted and health maintained. Diet concerns only the actual food ingested. Obviously an adequate diet is essential for adequate nutrition, but does not however, ensure the latter. Dr. Leonard's statement appears to refer to dietary problems chiefly, and therefore no consideration of nutritional factors other than diet will be here discussed.

Concerning sugar, white flour and niacin as mentioned, a fundamental of carbohydrate metabolism must be noted. No cell can utilize sugar (blood sugar) without at least three parts of the B vitamin complex: thiamin, riboflavin, niacin. Sugar and white flour being devoid of these elements, upset the body chemistry when they form part of a minimal or inadequate diet. In a diet

optimal both quantitatively and qualitatively, used by an individual with an excellent metabolic mechanism, some amount of either [sugar or white flour] may have little or no deleterious effect.

Dr. Ray M. Moose has very aptly described sugar as a "diluting" agent, in a communication to the *Journal of the American Medical Association* (July 8, 1944, p. 738):

"We may say, then, that sugar 'diluting with calories' decreases the vitamin (or other nutrient)/calory ratio and increases the difficulty of obtaining a diet nutritionally adequate to meet the daily allowances recommended by the Food and Nutrition Board of the National Research Council (*J.A.M.A.*, June 7, 1941, p. 2601)."

That there are many inaccuracies in the usual diet records submitted by patients is undoubtedly true. Nevertheless, if the patient is made to realize that it is not a policing matter at all, but a mutual effort to arrive at a starting point from which beneficial adjustments may be recommended, and that no change in diet or habit should be made at this time, a very useful and indicative record may be obtained. After using this method for a number of years, and noting an increasing accuracy in the results obtained, I am convinced that poor psychology is at the root of the failures. Rarely do patients first recording a week's food intake fail to state that the period was "an unusual one." As all dietary suggestions or discussions are strictly avoided until after the record for analysis has been submitted, I have frequently had a patient record the next week, and a few times, where the interest was sufficient, a third week. A comparison of the two or three records shows such slight variations in the general relationships as to be negligible. The important thing is to get as complete as possible a record of the total food and drink (except water) intake for the period. For convenience the form used designates three meals each day, but it makes absolutely no difference in the sum total what order or precedence is used. Actually we often find the between-meals items extremely important, and if too much emphasis is placed on meal records, valuable information is overlooked or slighted. The use of such a form requires attention and care, but if the patient cannot be impressed with the necessity for such, then there is little purpose in continuing the investigation.

Having obtained as accurate a record as possible, the matter of analysis and interpretation arises. The variables in mineral, vitamin, and other factor content of foods preclude anything but generalities, except for a controlled hospital-laboratory experimental procedure. So conceded averages are used. But there are certain relationships which have proved constant, and the interpretation lies therein.

Considerably more than 10,000 analyses of the diets of dental patients have been made by one laboratory in Southern California, with the following facts becoming increasingly clear:

1. Cases displaying active paradontosis show a phosphorus intake exceeding the desired one and one-half ratio to calcium (1 Ca:1.5 P). Such excesses will appear as 1:1.8 and ranging to such extremes as 1:3.5 in severe cases of vertical atrophy. The ratio is the important consideration; both calcium and phosphorus may be grossly deficient. Rarely is the phosphorus found to exceed the recommended 1.5 grams daily.

2. Cases of active dental caries show a marked deviation toward parity from the desired intake of acid-ash and base-ash foods in the ratio of 1:3, with this deviation due to the inclusion of large proportions of refined grain and sugar products. Such cases may show a ratio of 1 acid: 0.8 base. Cases of lesser susceptibility may show such a ratio as 1:2,2.5. Fortunately we possess a very accurate check method on these cases in the Lactobacillus acidophilus Index determinations.

Some analyses will show both the Ca-P imbalance and the acid-base imbalance, and if the latter is caused by acid-ash, refined grain and sugar products in the diet, we may be confident that both dental diseases are active. As stated above, the caries susceptibility may easily be verified.

Occasionally in very high protein, high fat diets, with no refined carbohydrates, a marked acid-base imbalance exists. In such cases active dental caries is not found. The dental symptoms, if any, appear to be in the dento-alveolar articulation, with a sensation of looseness in one or more teeth. The patient is apt to be conscious of the teeth in walking or otherwise jarring, and may note stiffness or soreness in other joints.

I believe this form of arthritis may explain the sudden death of the dental pulp with acute sequelae which has been observed in such circumstances of acid-base imbalance, and in the absence of either vertical atrophy or dental caries.

SUMMARY

In the diagnosis and treatment of dental disease the investigation of the nutritional and systemic background requires the following steps:

1. An accurate record of the total food intake over a period of seven consecutive days, or multiples of seven.
2. Complete analysis of the diet, which must include evaluation of the acid ash-base ash ratio, the calcium-phosphorus ratio, and the amount of refined grain and sugar products.
3. Correction of the diet based upon the the patient's sex, age, height, bone development, physical activity and climatic environment. Racial heredity may also be important.
4. As judgment and results indicate, investigation of other nutritional factor influences, such as the endocrines and emotional stresses.

LELAND D. JONES, D.D.S.
San Diego, California

Dr. Leonard's "Initial Statement" does him credit, for it shows that he is alert to new evidence being presented, and capable of changing his mind. Also willing to admit facts when properly and scientifically presented. His discussion shows much reading and research and he has presented the whole subject in a very fine way, practically proving the point that many cases of periodontoclasia may have a nutritional and systemic background.

"As a man eateth, so is he" is most reasonable. All tissues of the body need definite kinds and amounts of nutrients, and if certain tissues are deprived of these needed nutrients over a long period of time it is only logical that they will be affected more readily by irritation and yield more easily to infection. Certainly periodontists must never lose sight of the fact that the oral tissues are not an entity in themselves, but are parts of the greater entity, the body, and are influenced by conditions which affect the body.

I am glad to note that in calling attention to the fact that "where optimal nutrition prevails, dental diseases are almost nonexistent," Dr. Leonard also stresses the importance of the soil in which our foods are raised. This is rapidly becoming one of the most important problems in our country today and soil preservation and culture should be in the minds of all interested in optimal nutrition. The importance of the trace minerals in our food is being recognized more and more, but they will not be found in proper quantity or combination in starved soil. There is a little magazine called "*Organic Gardening*" printed at Emmaus, Penna., which carries some interesting information along this line.

Dr. Leonard mentions the work being done by the American Academy of Applied Nutrition here in Southern California. As a member of this group for the past seven or eight years, I can say that much pioneer work has been done and the foundation laid for still more scientific work in the future. Thanks to our having had the services of a very fine consulting nutritionist, Michael J. Walsh, M.Sc., F.I.C., A.I.Ch.E., who is very much interested in the dental angle of nutrition, and the patient efforts of a group of enthusiastic physicians and dentists, the organization has been able to make faster headway than otherwise could have been done. Records of several thousand cases have been kept and Dr. Walsh is about ready to publish some information which should be of great interest to periodontists and to the entire medical and dental professions.

In my own practice it has been routine for several years to get a one-week report on the diet of my periodontal cases. This is broken down into the amounts of protein, fats, carbohydrates, calcium, phosphorus, iron, iodine, the acid-base balance, etc., and the chief vitamins. As we know the *normal* amounts of these constituents needed for people of definite age, weight, height, and activity, it is easy to point out to the patient his handicaps. The picture is often so startling, that the patient is usually very willing to coöperate by changing his whole dietary regime if necessary.

As Dr. Leonard has pointed out, there are several uncertainties in this method of dietary evaluation, but it is a step in the right direction and must suffice until more accurate methods are devised.

Unfortunately, even if one gets a patient to coöperate fully in his *diet*, the matter of *nutrition* is something else again. Here we encounter the endocrine system with its effect on assimilation and, unfortunately, glandular therapy still has much to be desired in the hands of the average physician. Fortunately, in my own experience, patients requiring expert glandular therapy are in the great minority.

One thing that should not be overlooked by periodontists is the part that emotional stress plays in the nutritional picture and periodontal conditions. The observing operator will often find a very close tie-up in these relationships and will not expect too favorable results in such cases unless the emotional stress has been removed from the picture.

Dr. Leonard may be right in his statement that "convincing proof that susceptibility to periodontoclasia is due to nutritional defects is not yet at hand" for it is not easy to offer convincing, scientific proof of such a thing. However, to state it another way, no one, so far as I know, claims that nutritional therapy alone will cure an advanced case of periodontoclasia, but I contend that it is logical to believe that if all irritation and infection are removed from all periodontal areas, a proper dietary regime will go farther toward rebuilding healthy tissue and preventing a recurrence of periodontal trouble than an improper dietary regime—presupposing, of course, the same local post-operative care in both cases.

I believe in thoroughly drilling my patients on three major points for post-operative attention: 1. Cleanliness. 2. Circulatory stimulation. 3. Proper diet, which often includes proper vitamin and mineral concentrates. And this regime following thorough removal of all periodontal irritation and infection gets very satisfactory results in the great majority of cases.

It is my belief that the next great step toward handling the minority cases will be along the line of glandular and nutritional therapy. I think that the most advanced work along this line is being done by Melvin E. Page, D.D.S. of St. Petersburg, Florida, and his followers. Anyone interested in this angle of the work should read *Young Minds With Old Bodies* by Dr. Page.

FRANCES KRASNOW, Ph.D.*
New York 21, N. Y.

"The Nutritional and Systemic Background in Some Cases of Periodontoclasia" is well worth a formal discussion. As I read the "Initial Statement" I felt that I ought to suggest the following:

Re: Title—The term "nutrition" is very frequently understood to refer to "diet" only. Actually it denotes the whole combination of processes dealing with growth, maintenance and repair in the body. Hence "nutritional" and "systemic" have the same connotation.

Paragraph 6—Nutritionist and dietitian are often confused and so it would be more absolute to change sentence to read: Yet, it is rather to nutrition correction that we should turn for help in those cases.

Paragraph 7—would give my view more accurately if stated thus: The balance of the body is influenced by other factors. Stress is laid on (1) the optimal proportionality in food types: milk, vegetable-fruit, nonvegetable-nonfruit varieties, water, cod liver oil. Correct choice and preparation of these safeguard the vitamin complexes, complete proteins, and carbohydrates intake. (2) However, no less for vitamin assimilation than for foods generally, the organism must be primed with sufficient sleep as well as with regularity in all daily habits.

Paragraph 10, second sentence—calls for rewording—Dr. Krasnow at the Guggenheim Dental Clinic aiming to improve dental health also found improvement in general health when the patients coöperated. Recommendations are based on findings resulting from chemical analysis of saliva, dental examination, medical check including seven day diet analysis.

Paragraph 11, last sentence—would be more complete as follows: The bacteria of the soil are dependent on its complex inorganic-organic mixtures for the manufacture of the numerous substances required by the plants for their optimal growth.

Paragraph 13, second sentence ought to read—Enough is at hand to suggest that periodontists should ally themselves with specialists in this field as well as physicians, and become acquainted with the methods whereby the entire physiological plane of their patients might be analyzed.

*Nutritionist, The Murry and Leonie Guggenheim Dental Clinic.

JOHN OPPIE MCCALL, D.D.S.
New York 21, N. Y.

I find myself so much in agreement with the "Initial Statement" on nutrition in periodontoclasia that my remarks can well be brief.

I like particularly the statement: "The evidence for this [faults in nutrition as background predisposing conditions] is that where optimal nutrition prevails dental diseases are almost non-existent. Where dental diseases are rife, nutritional defects are extremely common."

The etiology of nearly all cases of periodontoclasia is, in my opinion, a combination of systemic and local factors. The relative proportions vary over a wide range. In cases of very young patients such as the twelve-year-old patients mentioned, the systemic factor is by far the more important. This has been impressed on me in the light of personal observation of such cases. Intensive study of such cases may yield more direct clues as to underlying conditions than we have been able to ferret out as yet.

I suggest the following elaboration of your statement attributed to Dr. Krasnow: The acid-base balance of the body as demonstrated in blood chemistry shows only the slightest variation under different dietary regimes. This balance is maintained by compensatory mechanisms that are well known. What we do not know so well is the over-all balance, the drains that may be made on the tissues under some circumstances and the abnormal demands on organs of elimination under other circumstances in the effort to maintain balance. When we know how to determine this over-all balance, we may have a clue to some of the obscure problems in periodontal disease as well as in dental caries.

At the same time it must be kept in mind that for the vast majority of cases of periodontoclasia which have developed after individuals have passed the age of 35-40, systemic factors are of minor significance. Correspondingly, adequate local treatment will, of itself, yield satisfactory results. It would be very unfortunate if dental practitioners were to adopt a defeatist attitude when confronted with advanced or even moderate periodontoclasia, taking refuge in an assumption that unknown and therefore untreatable systemic factors had brought the condition about.

DOROTHEA F. RADUSCH, D.D.S.
Minneapolis 2, Minnesota

The problem of nutritional and systemic background in periodontoclasia has been comprehensively outlined by Dr. Leonard. His concern over the inadequacies of the diet analysis and failures upon vitamin supplementation may stem from his method of approach to the problem. He says, "The diet analysis in the author's cases so seldom showed the suspected deficiency that he became discouraged with this method of diagnosis and treatment."

Let us consider this statement. Does it mean that most of the cases presented diet histories which approximated the standards for all nutrients, or was the author looking for a specific "suspected deficiency?"

The nutritionist who has examined many dietaries finds few which approximate the standards in all respects, or even in a majority of nutrients. Furthermore, variations from the standards differ from case to case. Unquestionably utilization and need for the many nutrients are interrelated. Thus lack of any one dietary factor may upset nutrition.

The nutritionist uses the history to find out whether important protective foods are eaten and if there is a balanced intake. It is not expected to show exact intakes of nutrients. The diet history has been discussed in detail in the *J. Periodontology*, July, 1946.

The diet history in periodontal diagnosis and treatment should be approached with an open mind. Do we become discouraged in the use of the radiograph because so many times it fails to indicate evidence to aid in diagnosis and treatment? No, we turn to other tests or signs.

With our present limited knowledge, I believe that the diet history can seldom be used as a "diagnostic" aid. I believe we should use it as one phase of general treatment; i.e., it assists us in determining whether our patient is taking at the time of treatment, a liberal supply of known essentials to keep the body well-nourished, and thus aiding us through the agencies of general bodily resistance and health.

If the patient is taking foods in quantities such as those of the Recommended

Dietary Allowances, then the problem of supply has been determined. It is still true, though trite, that when an automobile stalls, the first thing the mechanic checks is whether or not gasoline is in the tank. This obvious action is not generally applied in human ailments.

After supply of essentials has been established, then there is the problem of utilization. Much research is needed in this field. As yet, methods for studying intimate relations of nutrients to physiologic functions have not been devised for borderline deficiencies. This is particularly true as regards mineral deficiencies. Use of the newly developed sources of radio-active isotopes may permit effective investigation of mineral metabolism, and permit observance of the less dramatic effects of borderline mineral deficiencies. Lack of medical diagnostic tests for these borderline deficiencies may explain the futility of medical examination for aid in diagnosis of many periodontal cases, more especially those young patients referred to by Dr. Leonard.

It is not improbable that at some future time, dietary tests can become diagnostic tools. Until that time, dentists should promote dissemination of the present knowledge of nutrition. This should embody not only instruction in what to eat, but general rules of hygiene which influence nutrition. Patients need to be counseled on the need for sufficient hours of sleep, relaxation periods, proper meal-time surroundings, and the importance of three well-balanced meals daily. Dentists must consider the psychosomatic influences upon nutrition and systemic health.

Because there is as yet no large body of direct proof that periodontoclasia always or usually has some systemic background etiology, as stated by Dr. Leonard in the "Initial Statement," but because there are many significant findings although good diagnostic tests have not been devised, it is my opinion that no avenues of approach can be omitted by the conscientious dentist. Thus nutrition should be as routinely included as the other phases of treatment of periodontoclasia.

SIDNEY C. WERNER, M.D.*
New York 32, N. Y.

Dr. Leonard has presented a concise and good outline of the general nutritional problem in relation to periodontoclasia. Two points come to mind in this respect. First, the striking sex incidence of the disturbance in women as noted by Karshan and Tenenbaum suggests that any nutritional element if a factor to the disorder, acts as a trigger mechanism, rather than being a primary difficulty. A primary genetic or hormonal disturbance would appear to be fundamental.

Second, the question arises as to whether there is a significant difference in incidence of periodontoclasia between the privileged and underprivileged groups of the population, as is true for rheumatic fever for example. Otherwise, suspicion is against the nutritional aspect.

In respect to controlled objective nutritional studies, the difficulties are large. Historical surveys based on the patient's word are not very accurate, as stated. More impersonal tests are needed. Objective methods for the determination of some of the vitamin B-complex deficiencies are being made practicable, such as by excretion studies after administration of large amounts of the vitamin in question, i.e. the tolerance test method of Holt and Albanese. Blood levels are helpful but are not necessarily a reflection of the situation in the tissues. The tolerance test may be better.

Finally, it' should be remembered that nutrition includes fat, the individual amino acids as well as the proteins proper, and the tissue utilization of these materials as well as the other foodstuffs mentioned in the review.

*Associate Professor, Dept. of Medicine, Columbia University.

Concluding Statement

I AM WELL PLEASED with this discussion as it seems to indicate clearly the status of the subject at this time. It appears that some cases of periodontoclasia, especially in young girls, have a systemic origin. It very definitely suggests that periodontoclasia is not a symptom of some one subclinical dietary deficiency. It is one of those conditions like susceptibility to colds, susceptibility to furunculosis, tendency to arteriosclerosis and

other degenerative diseases which evidently have a nutritional background but the nature of which has not been established.

There is much clinical as well as laboratory research to be done and the data suggests that much of it may as well be done by properly qualified dentists as by medical clinicians. Study and treatment of defects in hygiene, sleep, living environment, mental factors, physical exercise, water intake, in addition to dietary defects with exact recordings, may well bring out some of the background factors for other types of ill health as well as periodontoclasia. Dentists have here an opportunity to make a fundamental contribution to the science of health.

—HAROLD J. LEONARD

Reports on 1946 Academy Seminar

Two brief reports on the lectures given by Drs. Smith Freeman and C. H. Best in the Sixth Postgraduate Program for the members of the American Academy of Periodontology sponsored by the W. K. Kellogg Foundation Institute for Graduate and Postgraduate Dentistry at the University of Michigan, Ann Arbor, Michigan, April 29-May 1, 1946.

I. The Physiology of Normal Digestion

By SMITH FREEMAN, Ph.D., M.D.

[Report prepared by Edgar D. Coolidge, D.D.S.]

The mechanism responsible for normal digestive function, as discussed, began with the act of swallowing or deglutition. This function is a coördinating wave of peristalsis which closes several exits from the oral cavity and opens one to the esophagus. The nervous control is both sensory and motor. The stimulation of the flow of salivary secretion of mucinous character is brought about by the sympathetic nervous system while the watery secretion is stimulated by the para-sympathetic system.

The activities of the gastric tract are divided into five sections as follows:

1. Motility
2. Secretion
3. Digestion
4. Absorption
5. Excretion

Motility consists in trituration and propulsive waves which aid in dissolving and forcing foods from the stomach reservoir more or less prepared for intestinal digestion and fairly well sterilized by the stomach secretion.

Digestion includes the dissolving of foods and reducing their toxic properties. In the process of stomach digestion proteins become mixed with gastric juice and a product is formed by incubation in the stomach which is an anti-pernicious anemia factor.

The total amount of secretion for 24 hours is as follows:

Saliva	1500 cc.
Gastric juice	2500 cc.
Bile	500 cc.
Pancreatic juice	700 cc.
Intestinal mucosa	3500 cc.

The nervous mechanism controls both motor and secretory functions of the digestive tract. The gastric phase of digestion is both secretory and mechanical and aside from the acts of secretion and digestion the essential hormone, histamine, is produced which is a hematopoietic agent. The normal hydrochloric acid product formed daily is from 30 to 60 units per 100 cc. of gastric juice. If the stomach contents become too acid an alkaline fluid will be regurgitated into the stomach from the intestine.

The sodium ion content of the secretion is the principal factor in retaining water and dehydration occurs when there are too few sodium ions present, while the water content is increased with an increase of sodium ions.

The loss of appetite and stomach discomfort often result from a disturbance in the nervous mechanism which consists of the vegetative nervous system and the parasympathetic nerves. In the intestine such disturbances may result in diarrhea and in the circulatory system may give rise to high

blood pressure, headache, fainting and tachycardia.

The gastric secretory response consists in three phases as follows:

1. The cephalic phase is both secretory and motor stimulated by any of the senses of sight, sound, smell, taste or thought. Appetite is stimulated by the flow of appetite gastric juice.

2. The gastric phase is started by the hormone histamine and the presence of food in the stomach. This phase is also both secretory and mechanical, the latter of which consists in trituration and propulsive waves. When the food in the stomach becomes suitably digested and prepared the pyloric sphincter opens and allows some of the acidified contents of the stomach to pass through into the small intestine.

3. The intestinal phase is largely secretory. *Enterogastrone* is stimulated by the presence of acid in the intestine. This hormone enters the blood stream and inhibits gastric mobility and hydrochloric acid in the stomach. *Secretin* stimulates the flow of pancreatic juices which enter the small intestine and continue the digestive process neutralizing the acidity of the food which comes from the acid medium of the stomach. *Cholecystokinin* stimulates the flow of bile into the small intestine which acts upon fats. When the contents of the small intestine become alkalinized sufficiently, enterogastrone ceases to flow and stomach function again becomes stimulated and gastric secretions flow.

The whole process of secretory response is coördinated and dependent upon the function of the vegetative nervous system and the para-sympathetic nerves. The nervous mechanism is often restricted or obstructed by psychological influences as well as by disease and thereby the necessary nutrition for body maintenance is lowered by an impaired digestive mechanism.

It was indicated that disturbances of motor or secretory activity of the gastro-intestinal tract might lead to interference in absorption of foodstuffs. It thus becomes apparent that disturbances in nutrition need not be dependent on an inadequate diet but may result from impaired absorption caused by functional or organic disease involving the digestive system.

In the afternoon lecture various disturbances of gastro-intestinal function were considered in relation to the effect on absorption and on the nutrition of the organism as a whole. The effect of loss of each of the digestive fluids (salivary, gastro-intestinal, pancreatic, biliary and intestinal secretions) on absorption was discussed.

Perhaps it would be worth while to consider some of the specific illustrations included in the talk. A patient was described who had loss of salivary secretion with marked erosion, gingivitis, and stomatitis. It was pointed out that nervous stimuli affect the amount and character of the salivary secretion and that this may have marked effect on the health of oral tissues.

The symptoms and characteristics of lesions of the esophagus were also described briefly and the common sites of injury to the esophagus were pointed out. It was explained that some of the operations currently popular in the treatment of peptic ulcer involved removal of a large portion of the stomach. The effect of gastrectomy on animals was described and illustrations were presented which showed the osteoporosis and skeletal deformities observed in dogs and monkeys subjected to this procedure. It was explained that loss of gastric function may occur without the stomach being removed, that there are so-called "dumping" stomachs which empty rapidly and consequently incompletely carry out the normal function of this organ. The effect of exclusion of bile from the gut on absorption and nutrition was described with emphasis on the loss of minerals and fat-soluble vitamins. Chronic diarrheas from many causes which markedly impair nutrition were discussed. Case reports were presented which included a patient with chronic diarrhea complicated by hemorrhagic diathesis.

This is in part the material presented which was intended to emphasize the concept that not only the intake of food but the efficiency of absorption must be considered in evaluating the nutritional status of an individual. (Freeman)

II. Insulin and Diabetes—In Retrospect and Prospect

By DR. C. H. BEST

Director, Banting and Best Department of Medical Research and Department of Physiology, University of Toronto

[Report on this lecture compiled by Charles H. M. Williams, D.D.S.]

The Banting Memorial Lecture of 1945 was delivered in Toronto by Surgeon Captain C. H. Best, O.B.E., F.R.S., under the above title. The material which he presented in the first of his two lectures in Ann Arbor to Academy members was essentially the same as his above-mentioned profoundly impressive address.

It is interesting to consider the value of such a lecture by such an eminent scientist before our group of periodontists. The increase in our knowledge of this disease

which affects the health of the periodontal tissues is of course of direct practical value; but the greatest value of this lecture might be attributed to its stimulating effect. Dr. Best caused his audience to live through the years of progress from Langerhans' observations on the pancreas in 1869—to the isolation and clinical application of insulin by Banting and Best in 1921—to the present—until finally we were left looking into the future for the further accomplishments that will be achieved for the benefit of diabetic persons. It is a thrilling story of the conquest of a dread disease. It inspires us to the confidence that some day, many of the apparently unrelated observations concerning periodontal disease will be correlated and applied to a more successful control and prevention of the disease than is now possible.

Paul Langerhans, as a medical student in 1869, discovered the structures in the pancreas which were later named in his honour, the islands of Langerhans. Langerhans did not know the function of these islets and it was not until a year after his death that Von Mering and Minkowski proved that complete removal of the pancreas invariably produces diabetes in some animals. From 1908 to 1921 Minkowski and hundreds of others tried unsuccessfully to detect the internal secretion of the pancreas. However, the studies of this period contributed tremendously to the knowledge of the diabetic state and to the procedures for estimating ketone bodies, sugar, and nitrogen in small amounts of blood. As Dr. Best said at this point and in his pleasing modest manner: "Thus in 1921 we had great advantages over previous investigators."

Dr. Best gave only an inkling of the many dramatic events that followed closely the isolation of insulin, its successful effect on depancreatized dogs and finally on diabetic humans. The rapid increase in demand for insulin made it desirable that the method of preparation be improved so that the insulin would have maximum purity and standardized potency. In 1926 Professor J. J. Abel obtained insulin from a natural source in crystalline form. Since that time many efforts have been made to prepare insulin synthetically but the complexity of the arrangement of the eleven component amino acids has so far prevented this attainment.

The insulin in use since 1926 is a zinc salt of the insulin protein. This preparation is gradually being replaced in favor by the protamine zinc insulin which was developed by Hagedorn and his group in Copenhagen. It has the advantage of a much longer effect because of slower absorption. Most patients require only one injection per day of this latter preparation, rather than the injection at each meal which is necessary with the ordinary insulin.

The demand for insulin in Canada and the United States has doubled every five years for the last fifteen years. This is a result not only of the addition of newly diagnosed diabetic persons being placed on insulin but it also indicates that diabetics taking insulin continue to live to almost normal life span. The demand for insulin has placed a heavy strain on the source of animal pancreas and the shortage of pancreas had threatened to become acute just before the war just concluded.

"The prospects of obtaining a more complete knowledge of the action of insulin and of improving in many ways the treatment of diabetic patients are very bright." (Dr. Best).

Radioactive agents may be used to trace the path that insulin follows in producing its effect on diabetes.

Earlier diagnosis of impending or incipient diabetes needs to be accomplished.

It seems that diabetes may be produced by an excess of the secretion of the anterior pituitary or adrenal glands. Accurate procedures for the assay of these diabetogenic materials in blood should be developed.

Better control of infection for diabetics by the use of penicillin holds promise of great value.

Other sources of insulin may have to be utilized.

In established chronic diabetes the function of the islet cells is irretrievably lost but in other cases, actual cure may be accomplished and prevention may then follow.

Dr. Best later discussed "Dietary Factors in the Protection of the Liver and Kidneys." —The action of choline, methionine and inositol in the prevention of fatty changes, necrosis, and cirrhosis of the liver, and in the prevention of degeneration of the kidneys.

Nutrition and Dental Health*

Contributed and selected
By DOROTHEA F. RADUSCH, D.D.S., B.A., M.S., *Minneapolis 2, Minnesota*

MATERNAL NUTRITION AND FETAL DEVELOPMENT (INCLUDING OSSEOUS DEVELOPMENT)

Condensed from: NUTRITION REVIEWS, 4:175, June, 1946

A GROUP of investigators in the Department of Child Hygiene at the Harvard School of Public Health studied maternal nutrition as related to the general physical well-being of infants at birth and during the neonatal period. A statistically significant relationship was shown to exist between the maternal diet and the condition of the infant. *(Nutrition Reviews* 1, 386, 1943.)

Of 31 infants whose mothers' diets were "excellent" or "good," 13 or 42 per cent were rated as "superior" and 14 or 45 per cent as "good" while only one infant was in the "poorest" group. Thirty-six infants whose mothers' diets were "poor" to "very poor" only one was "superior" and one "good" while 24 or 67 per cent were rated as "poorest." In the 216 cases studied, every stillborn infant, all but one of those who died within the first few days of life, all premature infants, all of those "functionally immature," and a majority of those with marked congenital defects were born to mothers whose diets during pregnancy were very inadequate.

Since the relationship between the prenatal diet and the course of pregnancy was less marked than that between the diet and the condition of the infant, the authors concluded that when nutrition during pregnancy is inadequate, the fetus suffers to a greater extent than the mother.

In a subsequent report, B. S. Burke, V. V. Harding, and H. C. Stuart *(J. Pediatrics* 23, 506, 1943) recorded their analysis of the influence of the amount of protein in the maternal diet on the physical characteristics of the offspring. Of the 216 women studied, only 10 per cent consumed diets during pregnancy which contained 85 Gm. daily of protein. Sixty-eight per cent of the diets contained less than 70 Gm. of protein and 38 per cent less than 55 Gm. A significant relationship was found to exist between the protein content of the mothers' diet and the birth length and birth weight of the infants and their physical ratings.

Further analyses of the data have been presented by H. C. Stuart *(Federation Proceedings* 4, 271, 1945). It appears that the osseous development of an infant at birth depends to a considerable extent on the maternal diet. The measure used was the presence of osseous centers in the hand, knee, and foot as shown by X-ray photographs. From these films each infant was given a rating of "advanced," "average," or "retarded." Among the 21 full term

*Nutrition and Dental Health will be continued under several aspects. Nutritionists will be invited to submit material which is pertinent to the subject; current literature will be briefly reviewed or abstracted; and a Question and Answer section will be available for any who may wish to use this service. Please mail any questions directly to the Journal Editor.

infants whose mothers' diets were "poor" or "very poor," only one was considered to have "advanced" osseous development while 13 or 61.9 per cent were "retarded." Among the 29 infants whose mothers' diets were "excellent" or "good," 8 or 27.6 per cent were rated as "advanced" and 3 or 10.4 per cent as "retarded." An even stronger relationship was shown between the osseous development of the child and the level of protein in the maternal diet while the correlation with the level of calcium was somewhat less striking.

Stuart suggests that if we are to obtain a clear understanding of the influence on health of maternal dietary habits, we should study suitable samples of four groups: first, married women of child-bearing age, second, pregnant women during the last trimester of pregnancy, third, newborn infants, and fourth, infants at about 3 months of age. In this way a more complete picture of maternal nutrition and its effect on both mother and offspring will be obtained.

The results obtained to date from these studies are striking and valuable. Confirmation by independent investigators, acceptance by obstetricians, and the results of the more complete studies now being planned will be awaited with interest.

NUTRITION IN THE AGED

Condensed from: NUTRITION REVIEWS 4:172. June, 1946.

THE new interest in geriatrics brings to attention how little is known concerning nutrition in the aged. J. Meyer, H. Sorter, and H. Necheles (*Gastroenterology* 5, 398, 1945) point out that there is a drop in the average rate of basal metabolism as age advances, the decline being more rapid in the male than in the female sex; but, to quote E. F. DuBois *(Basal Metabolism in Health and Disease,* Lea and Febiger, Philadelphia, 1936) "there is a great deal of variation in old people, probably depending on the degree of senility."

Meyer and associates found that the resting as well as the stimulated secretion of the salivary glands is diminished considerably. Together with a greatly decreased volume there is a greatly decreased ptyalin content. They did not find the amylase of the pancreas to be decreased in quantity. The volume, acidity, and pepsin content of the gastric secretion have been found to be reduced considerably with advancing age. Whether, in aged persons, the normal or increased pancreatic secretion with its ample secretion of trypsin can compensate for the reduced secretion of pepsin is a matter to be determined. The one component of pancreatic secretion which these workers have found to be decreased in old people is the lipase concentration. In such persons they have also found the blood lipase to be diminished considerably and significantly. Not a great deal is known about absorption in the aged but the same workers have found that the rate of absorption of galactose given orally is diminished significantly in old persons. It is not known but it is probably a fair assumption that other processes of selective or even of ordinary absorption may be diminished in old persons.

It is apparent that much study is needed for a clear understanding of

nutrition in the aged. From a practical standpoint and on the basis of present information it would seem wise to recommend that the diet for the aged approximate that of the normal adult and that the supply of minerals and of the B-complex be maintained at a satisfactory or increased level. The nutritive value of the diet should be enhanced by giving consideration to such factors as the consistency of food, size of meals, as well as the food tradition of the people concerned.

NUTRITIONAL PROBLEMS IN THE FOOD INDUSTRIES

Condensed from: NUTRITION REVIEWS 4:193, July, 1946.

THE importance of nutrition as a vital part of food processing and marketing has taken on a new significance the last few years. There has been an ever increasing emphasis by the food industries in applying the findings of fundamental nutritional research to the betterment of the wide variety of processed food products.

Basically, there are two parts to a good nutritional program:

First, the foods must contain the necessary nutrients, in adequate amounts.

Second, the people must be educated to eat foods in proportion necessary for good nutrition.

The food industry has a part in both phases, and processors have assumed the responsibilities associated with such a program.

A primary problem facing the food industry in the production of food with known and uniform nutrient content is that of securing improved raw products. The nutritional quality of these raw materials is a basic consideration in the production of high standard foods. Much research needs to be done in determining the diverse effects of different soils and climates on food quality. Research on plant and animal breeding is helping to contribute to the solution of this problem.

Raw material studies are essential for the determination of original vitamin and mineral content as a basis for the appraisal of processing losses. Assays are continued through the process necessary to food preservation for surplus storage and wide distribution. Washing, trimming, and blanching in the prepackage preparation of foods are all causes of some nutrient loss. Canning in glass or tin involves relatively high temperatures to achieve satisfactory bactericidal action. One of the great problems of the food industry concerns the development of methods of destroying bacteria without significant losses in nutrients. Electronic treatment or the use of bactericides which are harmless to man offer some promise.

Food industries should be most interested in impressing the American public with the virtues of better nutritive practices. Major governmental effort has been concentrated on nutrition charts, the bread enrichment program, and industrial nutrition. Just how much these efforts have helped to give Americans a desire for better all-around dietary practices is difficult to evaluate.

Taste and eye appeal will always play a major role in influencing food selection and these are based on early training of food habits. A major problem facing the establishment of a good nutritional regimen in America arises from faulty food habits. This can be overcome by sufficiently skillful and concerted education. Every food processor and every food agency can and should play its role in this educational program. Sound advertising as an educational device is often more effective than other channels. It should be truthful both by direct statement and by implication. Aggressive advertising is a constructive influence in bringing about improvements in food quality.

While many questions are yet unanswered with respect to the supplementary or sparing action of one nutrient and food to another and the special requirements for many normal and abnormal conditions, it seems clear that our present knowledge is far beyond its application to the dietary of most of our people.

Such a condition merits sober consideration. It calls for a program of education more effective than has heretofore been applied.

There have been posters and bulletins by the millions. There have been lecture courses by the thousands. Community and government sponsored committees all across the country have been active and certainly all of these agencies have had beneficial effects in the educational program. Despite all this fine work it is believed by some that the greatest influence in making people nutrition conscious has come through the medium of paid advertising by the food industry. Here, then, is an important avenue for general education of the public in matters of nutrition and public health. Advertising specialists know how to get attention and how to influence public action. These advertising people must however, become better educated in the field of nutrition.

The Nutrition Foundation has been helpful by supplying reliable information to teachers, science writers, newspaper editors, dietitians, home economists, public health officers, dentists, and medical practitioners. This is a worthy program because it informs those who are in a position to pass the information on to the public, but it needs to be supplemented and strengthened.

From these observations it is evident that the basic job of the food industries is to supply the American people with palatable, sanitary foods from which they can get a complete supply of all the required nutrients. Business succeeds only to the extent that it performs its function in serving society. While advertising and other forms of education are helpful and necessary, they cannot assure permanent success unless this basic function is fulfilled.

R. C. Newton[1]
H. E. Robinson[2]
Chicago, Ill.

[1]Member Scientific Advisory Committee, Representative from Industry.
[2]Member Food Industries Advisory Committee, Nutrition Foundation, Inc.

Editorials

Worth a Pound of Cure

THE old maxim concerning an ounce of prevention is no more applicable in any situation than it is in dental practice.

Throughout the years, most of the time and service of dentists had consisted of remedial measures, surgical, biomechanical, and therapeutic, with emphasis placed on restorations and replacements. Then some observing member of the profession called attention to the fact that the loss of the first permanent molars caused traumatic and malocclusion and extrusion of unopposed teeth which disturbed normal contact areas and occlusal plane relationships, resulting in dental caries. All this meant more restorations, and often further loss of teeth in the areas immediately involved. Many of these unfortunate consequences could have been prevented by properly constructed bridges at the time the teeth were lost.

The orthodontists then announced that they considered the first permanent molars the most important teeth in the natural denture and therefore they should be saved at any cost. They stressed the importance of early detection and filling of cavities in these teeth. The pedodontists then went a step further and advised that occlusal pits and fissures be filled before dental caries occurred. Later the nutritionists suggested that prenatal attention to the mother's nutrition and post-natal attention to that of the infant might result in better formed teeth with fewer defects. And finally, we are now seriously considering heredity in relation to dental caries—the ultimate in preventive factors.

In periodontia we have gone through phases of fads, fancies, and enthusiasms. At first we had vague ideas about some obscure etiology of periodontal disease associated with systemic factors which themselves were not then well understood. The chief interest then shifted to the use of drugs in treatment; iodine, trichloracetic acid, phenol, hydrofluoric acid, and not too long ago, emetin. Instrument types had the limelight for a time, files, planes, and curettes. Then followed and continues the discussions relating to methods, surgery, radical and conservative, versus curettage, the packing of pockets or their excision, or both, when to save and when to extract teeth with advanced periodontoclasia, forgetting meanwhile prevention in all cases. Naturally periodontists are not so guilty as are many others who wait until teeth are loose before giving the supporting tissues much attention. But are we not all guilty of neglecting to educate patients concerning their personal share of responsibility for the health of their mouths and of not giving detailed instruction in home care. If we had the coöperation of dental patients in applying preventive measures in so far as we now understand them, we would materially reduce the need for dentistry for these patients at least.

A friend who during a considerable portion of her married life, was obliged to move frequently from one city to another for business reasons, stated recently that she had been a patient of at least twenty dentists and but one of

these had asked or told her anything about the home care of her teeth, and he asked only what dentifrice she used. We must first sell ourselves completely on prevention as it relates to dentistry and become thoroughly informed on all prophylactic measures. It will be then natural to share our enthusiasm with dental patients.

We are now face to face with the hopeless backlog of dental needs and are forced to turn to the only possible solution of the social problem of dentistry —Prevention of dental and periodontal disease. —G.R.S.

William Brady, M. D.

Columnist

DR. BRADY does not believe the statement that, "Genuine pyorrhea [periodontoclasia] without a gingival pocket does not exist," according to his column in the *St. Paul Dispatch.* He writes, "Gingival pocket, my eye." Neither does he think much of periodontists.

In the *Boston Traveler* for June 5, 1946 this physician ridicules what he calls, "this season's fashion in imposing terms"—periodontoclasia. The title of the article, "Ten Dollar Word for Pyorrhea." He closes his comments by advising for a patient, vitamins A, C, and D, and chewing fruits, greens, vegetables, and grains. The gums to be swabbed twice weekly with dilute Talbot's Solution. (How dilute?) This can be applied at home after the dentist shows patient how, writes the Doctor.

In his favor, however, Dr. Brady does not believe in the wholesale extraction of the natural teeth. Unfortunately, he urges their retention no matter what the condition, according to one of his columns in a local newspaper some time ago. Is it is not time that this unenlightened dental advice to the public be counteracted? Too many people read and take the advice of Dr. Brady.

—G.R.S.

REQUESTS FOR BACK ISSUES OF THE JOURNAL OF PERIODONTOLOGY

There are a number of requests for complete files of the Journal, the last one from Holland. We are unable to supply the following issues:

JANUARY, 1930
JANUARY AND JULY, 1933
JANUARY, 1941
JANUARY, 1944
JANUARY, 1945

If any reader has any of these copies he would care to contribute, will he please communicate with the Editor. The Academy is desirous of filling these orders, especially those from libraries.

Final Program

Thirtieth Annual Meeting

AMERICAN ACADEMY OF PERIODONTOLOGY

Birmingham, Alabama

OCTOBER 17, 18, 19, 1946

THURSDAY

9:00 A.M.—Registration

9:30—First Session of the Twenty-Ninth Annual Meeting
Samuel R. Parks, President

Reports of Officers and Committees
Secretary, Raymond E. Johnson
Treasurer, C. Wesley Marriott
Committee on Program, Hunter S. Allen
Committee on Clinics, Harold G. Ray
Committee on General Arrangements, Hunter S. Allen
Committee on Scientific Investigation, Balint Orban
Committee on Nomenclature, Harry Lyons
Committee on Journal Subscriptions, E. Romle Romine
Committee on Credentials, C. Wesley Marriott

Special Committee Reports by:
Dorothea F. Radusch, Clarke E. Chamberlain, Arthur H. Merritt, E. Romle Romine, Harold J. Leonard, Clenet R. Ellis, Stanley C. Baker, Grace Rogers Spalding, Juanita Wade.

11:00—Presidential Address, Samuel R. Parks

2:00 P.M.—"Glossitis"
Arvin W. Mann, Fort Lauderdale, Fla.

2:45—"A Study of Reattachment"
Frank E. Beube, New York, N. Y.

3:30—"The Planning of Mouth Rehabilitation to Offset Periodontal Disability"
B. F. Sapienza, Birmingham, Ala.

4:15—"Hypoproteinemia (Amino Acid Deficiency) A Probable Factor or Co-Factor in Producing Periodontal Lesions"
James A. Sinclair, Asheville, N. C.

FRIDAY

8:00 A.M.—Past Presidents' Breakfast

9:00—Report on Past Presidents' Meeting
Robert L. Dement

9:15—Committee on Scientific Investigation
Balint Orban, Chairman

9:15—"Periodontosis in the Spider Monkey" (Preliminary Report)
Henry M. Goldman, Boston, Mass.

10:00—"Traumatic Occlusion and the Rest Position of the Mandible"
B. Gottlieb, Dallas, Texas

11:00—"Cancrum Oris"
R. Gordon Agnew, Toronto, Canada

12:30 P.M.—Luncheon—Academy Round Table
Dorothea F. Radusch and Clarke E. Chamberlain, *Leaders*

1. "Nutritional Aspects"
   R. Gordon Agnew
2. "Bruxism and Its Treatment"
   Dickson G. Bell
3. "Why is Periodontal Disease so Generally Neglected in General Practice of Dentistry and What Can the American Academy of Periodontology do to Improve the Situation."
   Monte M. Bettman
4. "Lesions of the Oral Mucosa, Their Diagnosis and Treatment."
   Frank E. Beube
5. "Is Gingival Hyperplasia Caused by Oral Infection or Does It Precede Infection."
   Edgar D. Coolidge
6. "Indication and Contra-indications for Surgical Elimination of Periodontal Pockets."
   Howard Hartman
7. "Restorative Dentistry in Corrective Treatment of Periodontology."
   C. W. Hoffer
8. "How Should Advanced Periodontoclasia in Young People in the Late Teens and Twenties be Managed?"
   Walter Leabo
9. "Vincent's Infection."
   Jules LeGrand
10. "Are Newer Drugs Like Penicillin the Solution for Recurrent Vincent's Cases?"
    Harold J. Leonard
11. "Psychosomatic Factors in Periodontal Etiology."
    S. O. Miller
12. "Control of Advanced Periodontoclasia: a Six Point Program Including Systemic Angle, Instruction in Home Care, Occlusal Relief, Operative Procedure, Proper Restorative Dentistry Where Required and Post Operative Care."
    Gerald A. Mitchell
13. "Importance of Occlusal Balancing and a Clinical Technic for Accomplishing It."
    E. Romle Romine
14. "What in General are the Clinical and Radiographic Findings Which Determine Whether Periodontally Affected Teeth can be Saved."
    Russell A. Sand

15. "The Evaluation of the Service of the Dental Hygienist."
Carlos H. Schott

16. "What Methods can be Employed to Determine Whether Repair of the Periodontal Tissues (Including Bone) has Taken Place After Completion of Periodontal Treatment."
Rowe Smith

17. "Prevention of Periodontoclasia."
Haidee Weeks

18. "Treatment of Cavities on Exposed Root Surfaces Following Periodontal Care."
R. L. Wescott

19. "Is There Clinically Obvious Normal Recession of the Gingivae?"
Charles H. M. Williams

20. "Views of the Periodontist's Wife"
Mrs. Rowe Smith

2:30-5:00—Clinics
Harold G. Ray, Chairman

Clinical demonstration of patients with gross pathological, dermatological and deficiency lesions.

Microscopic demonstration of biopsy material and diagnostic procedures given by: The Spies Clinic under the direction of Dr. Arvin Mann, Jefferson Hospital, Birmingham, Alabama.

Note—The membership will be assigned numbers on registration and the entire group divided in half. The first half will attend the Spies Clinic from 2:30 to 3:30 and the second half from 4:00 to 5:00.

The alternate group will visit Clinics at the Thomas Jefferson Hotel Ball Room as follows:

"Instrumentation."
Olin Kirkland, Montgomery, Ala.

"The Sharpening and Care of Curettes."
Clayton H. Gracey, Birmingham, Mich.

"The Radiograph in Periodontal Diagnosis."
Edward L. Ball, Cincinnati, Ohio

"Periodontal Diagnosis."
Michael DeRose, Chicago, Illinois

7:30—Annual Banquet. Ball Room. Thomas Jefferson Hotel

SATURDAY

9:15 A.M.—"Some Unusual Periodontal Problems"
Balint Orban, Chicago, Ill.

10:00—"Treatment of Periodontal Involvements"
Howard A. Hartman, Cleveland, Ohio

10:45—"Diagnosis Procedure in Periodontal Practice"
E. Romle Romine, Detroit, Mich.

11:30—Election

12:30 P.M.—Luncheon Meeting of the New Council

3:30—"Early American China" Illustrated with Colored Slides
Arthur H. Merritt, New York, N. Y.

4:30-6:00—Informal Tea for Members

Members of the American Dental Association in good standing are welcome to attend the scientific sessions of the annual meetings of the American Academy of Periodontology. Have you made your hotel reservations in Birmingham, Alabama, for the Thirtieth Annual meeting of the A.A.P.?

ABSTRACTS OF CURRENT DENTAL LITERATURE

(Continued from 17(1):48, Jan. 1946)

(e) Symptomatology and Diagnosis

(Continued from 17(1):46, Jan. 1946)

383—Darby William J.: **The oral manifestations of iron deficiency,** *J.A.M.A.* **130(13):**830-835, Mar. 30, 1946.

Darby finds that many cases interpreted as B avitaminoses, either entirely or in part, are in reality iron deficiencies. Many previous studies have referred to this possibility, notably those of Waldenstrom in 1938, but of these none have demonstrated that B therapy had been unsuccessfully used and a B deficiency thus ruled out as a concomitant etiologic factor. Schour and Massler in a recent review of effects of dietary deficiencies state that oral manifestations of iron deficiencies have been given much less consideration than those of calcium deficiency and merit investigation. Darby cites six cases presenting atrophic lingual papillae, superficial glossitis, cheilosis and fissures at angles of the mouth, and accompanied sometimes by dysphagia which responded to iron therapy alone after prolonged treatment with various B preparations had failed. He concludes that iron deficiency alone is a common cause of such oral lesions and should be considered in the interpretation of the significance of such oral changes as are recorded in nutrition surveys.

—*Celia Rich*

384—Frantzell, A. *et al:* **Examination of tongue: clinical and photographic study.** *Acta Medica Scandinavica,* Stockholm, **122:**207, Oct. 5, 1945. *Reprinted from N.Y.J. Dent.* **16(8-9):** 277, Aug.-Sept. 1946.

Frantzell and his associates carried out a clinical and photographic investigation of tongues from 200 normal persons and 1,300 patients with various diseases in the medical and surgical clinics of the University of Upsala. Smooth tongue was the most common pathologic change and was present in 102 patients. It was found that the condition could be attributed to iron deficiency in 27 cases. Other diseases in which smooth tongue was comparatively common were pneumonia, decompensated heart disease and malignant tumors. In 31 of the 102 cases no relationship was found between the disease and the smooth tongue. In pernicious anemia a smooth tongue is a common finding, and this condition was noted in 131 patients prior to treatment. In iron deficiency and in pernicious anemia cure of the atrophy of the papillae could nearly always be obtained with specific therapy. Only 14 of 135 cases of pernicious anemia were refractory to liver treatment. In 4 of these iron or yeast caused a rapid improvement. Four cases of paralysis agitans presented a smooth tongue; in 1 of these cases treatment with pyridoxine injections was practiced but proved ineffective. The effect of a dental prosthesis on the surface of the tongue was studied. Fourteen per cent of the men and 47 per cent of the women had upper prosthesis. The presence of a prosthesis did not materially interfere with the effect of therapy. The prosthesis is not to be considered as the chief causative factor of the atrophy of the papillae, but the possibility that a prosthesis worn for many years may facilitate the appearance of this atrophy must be considered. A proposed hypothesis is that the lingual papillae are sensitive to a lack of oxygen and do not regenerate in the normal way if the oxygen supply is impaired—lack of iron, lack of oxygen, lack of riboflavin or lack of nicotinic acid. If this concept is correct, the surface of the tongue may be used as an important index of the degree of hydration of the body and as a mirror of the intracellular oxidative process.

385—Furstenberg, A. C., and Elizabeth Crosby. **Disturbance of the function of the salivary glands.** *Ann. Otol., Rhin. & Laryng.* **54:**243, 1945. Abstr. in *J.A.D.A.* **32(19):**1328. Oct. 1945.

Dysfunction of the salivary glands may be either psychogenic or organic. In addition to partial impairment of salivary activity through gross or microscopic pathologic alteration of glandular tissue, widespread dysfunction of the salivary mechan-

ism may result from some impairment of the nerve supply to the glands. The dysfunction appears to be the result of end-organ lesions of the peripheral secretory nerves. This fact seems to be substantiated by the prompt physiologic action of the mechanism of salivation after the administration of pilocarpine. The effect of the drug is augmented by the simultaneous ingestion of the acid-forming salt, ammonium chloride. The institution of this treatment for a period of three to six weeks has been followed in some patients by a return to normal salivation. Although the exact mechanism is not clear, either spontaneous cellular regeneration or medicamentous stimulation of the salivary glands, may favor an adjustment to normal function. Organic lesions of the central nervous system may also be implicated in salivary gland dysfunction, but are associated conspicuously with paralysis of other cranial nerves.—*R. P. Likens.* —*Copy*

386—Graham, J. W. E.: **Mouth conditions in some systemic conditions.** *South African D. J.*, **20(1)**:1-5, Jan. 1946. *Reprinted* from *Columbia D. Abstr.* **2(3)**:12. May 1946.

Familiarity with the clinical pictures of systemic conditions as they manifest themselves in the oral cavity is an essential for the dentist. Brief resumés of the author's search through the literature provides the clinical symptomatology of dyspeptic ulcer, diabetic tongue, agranulocytosis, leukemia, uremic stomatitis, purpura hemorrhagica, scurvy, Addison's disease, allergies, sprue, dilantin hyperplasia, pregnancy tumors, pemphigus, pellagra and syphilis.

—*C. B. Rackson*

387—Morgan, Hugh J., *et al:* **Health of repatriated prisoners of war from the Far East,** *J.A.M.A.* **130(15)**:995-999. April 13, 1946.

In a careful study of 4,618 patients suffering from prolonged malnutrition and mistreatment, the authors found among other conditions the following mouth lesions:

37 Cases of "gingivitis with bleeding."
102 pellagrous glossitis
270 atrophy of papillae of tongue
120 cheilosis
130 angular fissures of lips and mouth.

In many instances two or more of these conditions were correlated. No unusual pathologic condition of the teeth themselves was noted. "The number of carious teeth was less than that of the same age group living under normal conditions, which might be accounted for by the low amount of sugars in their dietary regimen. Radiograms of the maxillas did not disclose any excessive bone destruction, and the bony pattern was considered normal."

—*C.R.*

388—Query: **Halitosis from dilantin,** *J.A.M.A.* **131(10)**:874. July 6, 1946.

Can you please tell me whether or not dilantin will cause halitosis?

The use of dilantin (diphenylhydantoin sodium) may cause halitosis in two ways: First, it often causes gingival hypertrophy. This problem can be met only by extremely painstaking dental care and massage of the gums with toothbrush and fingers twice a day for five minutes at a time. If the gums and teeth can be kept in good condition, there is no reason why halitosis should arise from the mouth.

Second, dilantin occasionally causes disturbance of digestion with eructation and formation of gas. This difficulty can usually be overcome by the use of neutral dilantin in oil in equivalent doses instead of sodium dilantin. —*Copy*

389—Isaac Schour and Maury Massler: **Effects of dietary deficiencies upon the oral structures.** *Physiol. Rev.* **25**: 442, July, 1945. Abstr. in *J.A.D.A.* **32(19)**:1330. Oct. 1945.

The oral tissues, because of their sensitivity to nutritional deficiencies and dietary aberrations, have been called the barometer of the state of nutrition of the body. The routine examination of the teeth, the gums, the tongue, the lips and the saliva at periodic intervals is believed to be a simple and fairly accurate method of determining the nutritional status of both the child and the adult.

With this thought in mind, the authors discussed the effects of deficiencies of various dietary constituents upon the oral and dental structures with special reference to the deviations from the normal clinical pictures of growth and development.—S. *Wah Leung.* —*Copy*

390—Steinberg, B. H.: **Xerostomia: Discussion and report of a case of psychogenic origin.** *J. Second District D. Soc.* **32(3)**:115. Mar. 1946. *Reprinted from Columbia D. Abstr.* **2 (2)**:8. May 1946.

Xerostomia is a condition of dryness of the mouth caused by diminished or arrested secretion of saliva. It is classified into three groups:

1. Psychogenic.
2. Senile (caused by idiopathic atrophy of the salivary glands).
3. Organic neurosis of the medulla oblongata.

The symptoms consist of dry mouth with pale, shiny, mucous membranes, dry, deeply fissured, red tongue and dry, scaly lips. Stones may be found in the salivary ducts, and the glands themselves may be hard and palpable. The disease may come on suddenly or over a period of months. Prognosis depends on the etiology.

The specific case reported in the article was one associated with the wearing of a poorly constructed acrylic partial denture. Only when the patient wore the denture did he have symptoms which cleared up soon after the denture was removed from the mouth. Operative procedures and a new acrylic partial were substituted and there was prompt relief of the symptoms.

—*B. Kafka*

391—Sweden Correspondent: **Tobacco and oral inflammation.** *J.A.M.A.* **130(14)**: 964. Apr. 6, 1946.

A widespread form of oral inflammation, difficult to treat, is troubling physicians and dentists in Denmark. It is believed that its severe character is due to the poor quality of the Danish tobacco, which irritates the mucous membrane, leaving it less resistant to infection. Many patients, not realizing that they are suffering from this inflammation, merely feel extremely tired, and Danish doctors believe that in these cases the infection has become generalized. —*Copy*

392—Wilson, Jas. R.: **Vitamin deficiencies: stigmas, symptoms and therapy.** *J.A.M.A.* **131(8)**:666-667, June 22, 1946, also *Current Comment* **131(8)**:670. June 22, 1946.

A syllabus embracing consensus of current views on vitamins prepared by the Council on Foods and Nutrition of A.M.A. Wilson who is secretary of the Council collaborated with various medical nutritionists and the results should be considered authoritative. Stigmas suggesting lack of vitamin C include; redness, edema, tenderness and bleeding on pressure of the gums; thickening and increased firmness of the gums; retraction of the gums; loosening and shedding of the teeth, and increased capillary fragility. Treatment for all states, acute, sub-acute or chronic is 100 mg. of ascorbic acid daily over a considerable period. Except for the cheilosis of riboflavin deficiency, ascorbutic acid is the only vitamin the lack of which presents definite oral symptoms. Continued rapid development of the subject makes many of the statements tentative and likely to be revised. Present knowledge does not justify the characterization of many of these symptoms as conclusive or pathognomonic particularly when observed as isolated findings, and they should be corroborated by the presence of other changes and a history of inadequate diet before being considered avitaminoses. It is emphasized that vitamins must never be substituted for consumption of an adequate diet. —*C.R.*

(f) Treatment

(Continued from 17(1):48. Jan. 1946)

706—Boyko, G. V.: **Care of the surgical patient.** *Journal of Oral Surgery*, **4 (1)**:40-47. Jan. 1946. Abstract *reprinted* from *Columbia D. Abstr.* **2 (3)**:3. May 1946.

The care of the surgical patient is discussed, with emphasis on the preoperative examination which acquaints the dentist with the physical health of the patient, and instills confidence in the patient. A discussion on various types of premedication follows including the use of prophylactic chemotherapy if it is indicated. Dr. Boyko emphasizes the need of telling the patient what to expect and the use of typewritten instructions, instead of just telling the patient what to do. Postoperative treatment is an important part of the care of a surgical patient. If necessary, the dentist should have the patient's physician coöperate with him in the care of the patient.

—*B. Kafka*

707—Brodsky, R. H. and Herschfeld, L.: **Oral penicillin in the treatment of oral lesions.** *Quarterly Bul. Sea View Hospital.* April, 1946. *Reprinted from N.Y.J. Dent.* **16(8-9)**:278. Aug.-Sept. 1946.

Enterally administered penicillin was used as the sole therapy in 13 cases of advanced periodontoclasia, 5 cases of Vincent's angina, and 10 miscellaneous cases of dental infection and maxillary sinusitis. The dosage was 14 tablets daily for 3 days, each containing 25,000 units, making a total daily dosage of 350,000 units. To counteract gastric acidity, the penicillin was buffered with magnesium oxide, aluminum hydroxide, and calcium carbonate. In some conditions this course of treatment was repeated several times.

Eleven of 13 cases of periodontoclasia were reported to show definite improvement, with disappearance of suppuration and tightening of the teeth. All 5 cases of Vincent's angina, miscellaneous periapical infections, and antral involvement, were improved.

The authors suggest that penicillin orally administered in this form is sufficiently buffered to overcome gastric activity and is as effective therapeutically as one-fifth to one-third the dosage of penicillin injected intramuscularly. The only untoward effect noted was a small incidence of diarrhea.

—*Leo Stern, Jr.*

708—Hebbs, J. H.: **Dental health in children.** *J. Canad. D. Assoc.* **12(3)**:114. Mar. 1946. *Reprinted* from *Columbia D. Abstr.* **2(3)**:24. May 1946.

Dental health in children is just as much the physician's problem as it is the dentist's. It is a problem of prevention and protection, more than of restoration. The physician should see that the child, from the time of birth, is on an adequate diet, complete with all the components necessary for good growth of bone and tooth. All the early signs of deformity, allergy and bad habits should be noted by the physician and should be corrected by him before damage is done to the dental mechanism. The child should be taught how to clean his teeth properly, and improper foods should be eliminated from the diet before harm is done. There should be close coöperation between the physician and dentist in teaching these preventive aspects of dental health. —*B. Kafka*

709—Levitt, R. O., and W. W. Leathen: **Penicillin lozenges in treatment of oral infections.** *Occupational Medicine*, Chicago, 1:1-98, Jan. 1946; in *J.A.M.A.* **131(2)**:183. May 11, 1946.

One hundred and seventeen patients of the armed forces with acute infection of the nasopharynx and tonsils were treated with penicillin lozenges of 500 units strength each. The lozenge was made of acacia and penicillin in the required dosage and included powdered sugar and peppermint as flavoring agents. The patients were warned not to chew or suck the lozenge but to permit it to dissolve. Of these 117 patients, cures were produced rapidly in 110 (94.2 per cent). Hospital days were fewer for patients treated with penicillin than for those receiving non-specific treatment. Eighty-seven patients were successfully treated on an outpatient status, thereby saving many hospital beds and man hours for effective duty. Vincent's infections of the mouth are successfully treated with penicillin lozenges. Penicillin locally appears to have no effect on deep tonsillar infections.

—*Copy*

710—Linghorne, W. J., *et al:* **Relation of ascorbic acid intake to gingivitis,** *Canadian M. A. J.* **54**:95-212 (Feb.) 1946, in *J.A.M.A.* **131(4)**:358. May 25, 1946.

Linghorne and his associates say that examination of service personnel and apparently healthy young civilians in Canada has revealed that inflammatory changes in gingival tissue are of frequent occurrence. Surveys of 1,448 apparently normal air force personnel under 30 years of age, including civilians on entry as well as persons who had been in service for several months, showed that approximately 20 per cent had gingivitis, usually asymptomatic, of a degree which could be readily detected by superficial examination of the oral cavity. Studies were conducted on air force personnel to investigate the effects of various nutrients on the incidence of gingivitis. The first study demonstrated that the administration of large amounts of vitamins A and D, thiamine, riboflavin, nicotinic acid and ascorbic acid for a period of five months had no clinical effect on preëxisting inflammation of the gingivae. The second study indicated and the third study confirmed that when gingivitis was cleared to a maxi-

mum degree by local treatment, the addition of 75 mg. of ascorbic acid daily had a delaying effect on recurrence. A diet containing 75 mg. of ascorbic acid retarded recurrence to a greater degree than 25 mg. of ascorbic acid daily. There was no significant difference between the effect of a diet containing 10 mg. of ascorbic acid and one containing 25 mg. of ascorbic acid. The retarding effect on recurrence of gingivitis of a diet containing 75 mg. of ascorbic acid was not significantly different from that of a diet containing 10 mg. of ascorbic acid plus 70 mg. of ascorbic acid in tablet form. The microscopic appearance of the gingival tissues encountered in these studies in no way resembled the changes seen in scurvy. —*Copy*

711—Marks, M. B.: **Penicillin treatment of oral inflammations in childhood.** *J. Pediat.* **26**:582. June, 1945. Abstr. in *J.A.D.A.* **32(19)**:1330. Oct. 1945.

Penicillin administered topically or by injection is reported to have been used successfully in the treatment of two cases of thrush, two cases of Vincent's infection and one case of herpetic stomatitis in young children. Parenteral administration of the drug resulted in somewhat more rapid cure than topical application.—*Paul H. Keyes.*

—*Copy*

712—Meadley, R. G. S. and Barnard, H. F.: **Local penicillin for throat infections,** *Lancet* **1**:77-112. Jan. 19, 1946. Abs. in *J.A.M.A.* **130(17)**:1268. Apr. 27, 1946.

Meadley and Barnard report a study of the effectiveness of local therapy in cases of acute tonsilitis due to hemolytic streptococci or Vincent's angina. Twenty-seven patients were treated with a penicillin sulfathiazole snuff containing 1,000 units of penicillin per dose and 30 controls with gargles and throat sedatives. A more rapid relief of symptoms and a shorter period off duty was obtained in the penicillin treated cases, especially in those with Vincent's angina. Bacteriologically there was a significant improvement in both types of infection through use of the penicillin snuff. Two severe cases, one streptococcic and one of Vincent's angina, which did not respond to local penicillin rapidly improved on systemic penicillin. —*Copy*

713—Miller, S. C.: **Rational treatment of periodontal disease.** *J. Second District D. Soc.* **32(3)**:110. Mar. 1946. *Reprinted from Columbia D. Abstr.* **3(2)**:11. May, 1946.

Periodontal disease is caused by a combination of factors. These factors may be placed in three categories—improper function of the dentition, irritation, and systemic factors. It is essential to restore functional coördination and individual tooth balance in periodontal treatment.

There are several methods of periodontal pocket elimination. These are: (1) radical pocket elimination with removal of the soft tissue wall of the pocket, (2) conservative surgery for inaccessible pockets, (3) conservative subgingival curettage.

It is also believed that a systemic factor and psychosomatic disturbance, may be important in this disease. —*W. Engel*

714—Paul, W. D.: **Toxic manifestations of large doses of vitamin D as used in treatment of arthritis.** *Iowa State Med. Soc. J.* **36**:133-186. April, 1946. Abstr. in *J.A.M.A.* **131(7)**:634. June 15, 1946.

Paul presents 5 cases to illustrate the clinical signs of vitamin D poisoning. He stresses that large doses of vitamin D may cause severe hypervitaminosis, particularly if combined with a high calcium intake in the form of milk. The dose of vitamin D should be based on body weight, rather than age, and whether or not it is given in milk. The usual toxic symptoms of vitamin D administration are headache, nausea, vomiting, diarrhea, epigastric fullness, polyuria and polydipsia. The signs of toxicity are low specific gravity of the urine, traces of albumin in the urine, inability to concentrate urine, increased serum calcium, renal failure, retention of nonprotein nitrogen, deposition of calcium in soft tissues, deposition of calcium in arteries and arterioles and, eventually, death. Massive doses of vitamin D do not alter the ultimate course of arthritis. Whenever massive doses of vitamin D are prescribed, the urine should be examined frequently and serum calcium levels should be obtained. —*Copy*

715:—Query: Atypical lichen planus, *J.A.M.A.*, **131(4)**:366. May 25, 1946.

Replying to query concerning atypical lichen planus it is suggested that mild alkaline washes may benefit mouth involvements

in case they become distressing. For general symptoms tonics should be administered and, where indicated, vitamin therapy and other means to promote the general health.

—*C. R.*

716—Query: Monilia albicans infections, *J.A.M.A.* **130(8):**545. Feb. 23, 1946.

Is there any effective treatment of infection with Monilia albicans involving the mouth, throat and chest?

Infections with Monilia albicans are seldom primary in nature but usually occur because the resistance of tissues is diminished by other factors such as vitamin deficiencies, infections or general debility. Treatment, therefore, should be first directed to correcting the underlying cause or causes. Specific treatment is unsatisfactory. Potassium iodide is usually advocated especially when the bronchi and lungs are involved, but there is little or no evidence of its specific value. For infections involving the oral mucous membrane mild alkaline mouth washes or solution of gentian violet (1:10,000) have been used, but again without evidence of specific effect. The same may be said for vaccine prepared with monilia.

—*Copy*

717—Titche, L. L.: **Tuberculosis of the Tongue.** Condensed from *American Review of Tuberculosis.* **52:**342. Oct. 1945. *Reprinted* from *Dentistry.* **6(7):**398. Mar. 1946.

The tongue of practically every patient with active pulmonary tuberculosis is continuously exposed to bacilli-laden sputum. The relative infrequency of tuberculosis of the tongue is probably due to the thickness of the mucosa and the marked general resistance of striated muscle to bacterial invasion. The mechanical cleansing effect of saliva and the continual movement of the tongue undoubtedly play some part.

There are several types of lesions: (1) ulcers, (2) fissures, (3) granulomata, (4) tuberculomata and (5) glossitis. Of these the ulcer is the most frequent. There is no definite site of predilection though the lateral margins of the tongue and the tip are more commonly involved.

The symptoms of tuberculosis of the tongue are variable. Pain is usually late, occurring only after the infection progresses. The pain is severe, continuous and progressive. Treatment is mainly palliative, since the majority of cases are in the terminal stage of the disease. In early cases, excision followed by cauterization, or the initial cauterization of the lesion may effect a cure. In terminal cases, the application of local anesthetic agents may afford some relief, though at times it may be necessary to resort to injection of the lingual nerves with alcohol to control the pain.

The majority of the 28 cases studied occurred in the 4th decade of life. The lesion of the tongue healed in 8, but 4 of these patients succumbed to the disease of the lung. Fourteen patients did not show any improvement and died within 5 days to 5 months after the diagnosis of tuberculosis of the tongue had been made.

718—Wright, Roy B. and Rule, Robert W., Jr.: **Penicillin Lozenges in treatment of oral lesions.** Condensed from the *Jour. of the Cal. State D. Assoc. Reprinted* from *J. Canad. D.A.* **12(4):** 185. Apr. 1946.

A total of 151 patients with periodontal lesions were treated with penicillin sodium lozenges. Of this group, 9 per cent were sensitive, developing mild toxic manifestations.

There were thirty-eight patients treated with penicillin calcium lozenges, 16 per cent of whom developed severe toxic reactions.

Although the beneficial results obtained from the use of lozenges containing sodium salts and those containing calcium salts of penicillin are equally satisfactory, we have considered it advisable to limit the number of cases treated with lozenges containing penicillin calcium as now compounded, . . .

Reactions to penicillin sodium lozenges have been comparatively mild and show little variance from the previous report.

CONCLUSIONS

The incidence of toxic reactions to the use of penicillin sodium lozenges does not preclude their use, except that caution should be exercised with known sensitive individuals.

On the basis of our continued investigations in the larger series of cases treated, there is a preponderance of evidence to indicate that penicillin is a superior therapeutic agent when employed in the treatment of acute oral infections and that the lozenge is a highly satisfactory dosage form for its administration.

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